

Abstract – Andrew Maicke

EC5 – Space Suit Assembly Team

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Main Projects

There were three main projects in this internship. The first pertained to the Bearing Dust Cycle Test, in particular automating the test to allow for easier administration. The second concerned modifying the communication system setup in the Z2 suit, where speakers and mics were adjusted to allow for more space in the helmet. And finally, the last project concerned the tensile strength testing of fabrics deemed as candidates for space suit materials and desired to be sent off for radiation testing.

Major Duties

The major duties here are split up between the major projects detailed above.

For the Bearing Dust Cycle Test, the first objective was to find a way to automate administration of the test, as the previous version was long and tedious to perform. In order to do this, it was necessary to introduce additional electronics and perform programming to control the automation. Once this was done, it would be necessary to update documents concerning the test setup, procedure, and potential hazards. Finally, I was tasked with running tests using the new system to confirm system performance.

For the Z2 communication system modifications, it was necessary to investigate alternative speakers and microphones which may have better performance than those currently used in the suit. Further, new speaker and microphone positions needed to be identified to keep them out of the way of the suit user. Once this was done, appropriate hardware (such as speaker or microphone cases and holders) could be prototyped and fabricated.

For the suit material strength testing, the first task was to gather and document various test fabrics to identify the best suit material candidates. Then, it was needed to prepare samples for testing to establish baseline measurements and specify a testing procedure. Once the data was fully collected, additional test samples would be prepared and sent off-site to undergo irradiation before being tested again to observe changes in strength performance.

Major Project Accomplishments

For the Bearing Dust Cycle Test, automation was achieved through use of a servo motor and code written in LabVIEW. With this a small electrical servo controller was constructed and added to the system.

For the Z2 communication modifications speaker cases were developed and printed, and new speakers and mics were selected. This allowed us to move the speakers and mics to locations to remain out of the suit users way.

For the suit material strength testing, five material candidates were identified and test samples were created. These samples underwent testing, and baseline test results were gathered, though these results are currently being investigated for accuracy.

Process Efficiencies

The main process efficiency developed during the course of this internship comes from automation of the Bearing Dust Cycle Test. In particular, many hours of human involvement and precise operation are replaced with a simple motor setup. Thus it is no longer required to man the test, saving valuable employee time.

Impact on Intern

This internship has confirmed a few things for me, namely that I both want to work as an engineer for an aerospace firm and that in particular I want to work for the Johnson Space Center. I am also confirmed in my desire to work with electronics, though I was surprised to enjoy prototyping 3D CAD design as much as I did. Therefore, I will make an effort to build my skills in this area so that I can continue to design mechanical models. In fact, I found the process of hands-on prototyping to be perhaps the most fun aspect of my time working here. This internship has also furthered my excitement for continual education, and I will hopefully be pursuing a masters in my field in the near future.